DRAFT
Lower Boise River Watershed
Best Management Practices List

Document Purpose

Selected nonpoint source BMPs can be used to generate transferable credits subject to requirements outlined in the Pollutant Trading Requirements document. This BMP List describes which BMPs can be used for trading, as well as each BMP's procedures for determining the amount of credits and its monitoring requirements.

Calculated and Measured Phosphorus Credits

To offset a given amount of phosphorus at one location from a point source, there must be an equal and beneficial reduction from another point or nonpoint source location. The term "credit" has been established to represent that equalized portion of phosphorus considered in the trading market. The reduction is calculated or measured in pounds of phosphorus, determined by one of two methods. These reductions are then converted to credits for trading purposes.

To estimate what a BMP's capability is in reducing phosphorus losses, local sampling data is needed in order to make that estimate. Where there is adequate data for a specific BMP's reduction capability, a calculation can be made with fair certainty of it actually occurring. Where data is limited, "measuring" for phosphorus removal is necessary. For pollutant trading, participants may use either the calculated or measured approach to generate credits. The calculated approach will utilize existing data to estimate an average reduction for a particular BMP, with a slight discount in its effectiveness due to potential uncertainty in the data and other management factors. For measured credits, grab samples will be taken during the BMP's operation to quantify the actual reductions. An inflow and outflow condition will be necessary to sample a BMP.

Current Eligible BMPs for Trading

Eligible BMPs are listed in Table 1 and in the appendix, Carter 2002. The NRCS practice code and typical lifespan are included here.

Table 1. BMPs Currently Eligible for Trading.

BMP	NRCS Code(1)	Lifespan
Sediment basins	350	20 years
Filter strips	393	1 season
Underground outlet	620	20 years
Straw in furrows	484	1 season

Crop sequencing	328, 329	1 season
Polyacrylamide	450	1 irrigation
Sprinkler Irrigation	442	15 years
Microirrigation	441	10 years
Tailwater Recovery	447	15 years
Surge Irrigation	430HH	15 years
Nutrient Management	590	1 year
Constructed Wetland	656	15 years

(1) Refer to http://id.nrcs.usda.gov/practices.htm
Additional components for the BMP may incorporate other practice codes.

BMP Efficiency and Uncertainty Discounts

Listed in Table 2 are the effectiveness and uncertainty discounts for the currently eligible types, field, farm, and watershed scale. The sediment basin is categorized into three types, which are due to differences in the size of treatment area and duration of flow in the basins.

Nutrient management does not have a phosphorus reduction efficiency due to numerous complexities. This practice, however, is a necessary long-term practice that will benefit water quality if applied properly. Though this practice does not have an efficiency associated with it, it is a valuable BMP for trading and will be marketable in relation to other applied BMPs. If nutrient management is applied in addition to other eligible BMPs, the uncertainty factor for those other BMPs will reduced by 50%, thereby increasing their market value.

Table 2: BMP Effectiveness and Uncertainty Discounts

BMP	**Effectiveness**	**Uncertainty**(1)
Polyacrylamide	95%	10%
Filter Strip	55%	15%
Sprinkler	100%	10%
Microirrigation	100%	2%
Tailwater Recovery	100%	5%
Mulching	90%	20%
Crop sequencing	90%	10%
Sediment Basin Field scale	80%	10%
Sediment Basin (farm scale)	75%	10%
Sediment Basin (watershed scale)	65%(4)	15%(4)
Underground Outlet	85% (65%)(2)	15% (25%)(2)
Surge Irrigation	50%	5%

Nutrient Management	NA[3]	NA[3]
Constructed Wetland (farm scale)	90%	5%
Constructed Wetland (watershed scale)	NA[4]	NA[4]

[1] This is to be subtracted from the efficiency**.**
[2] This BMP's effectiveness drops after 2 years.
[3] Data unavailable for efficiency estimate. If applied with other eligible BMPs, their uncertainty discounts will be reduced by 50%.
[4] Not recommended for calculated credit.

BMP Monitoring: Evaluation and Measurement Requirements

To ensure that a BMP is operating properly and actually reducing phosphorus losses, an evaluation is necessary. An evaluation will consist of at least one annual field inspection to ensure proper application and operation. Table 3 provides the minimum inspections needed for each BMP, and provides a minimal level of measurement requirements, though not applicable to all BMPs.

Some BMPs do not allow for true "inflow-outflow" comparisons utilizing flow and nutrient measurements, therefore it is not recommended for measurement. Also, a measurable BMP's inflow conditions only represent the instantaneous condition, not reflective of the 1996 baseline condition. In essence, these instantaneous measurements would provide a pretreatment load different than that of the baseline average load, misrepresenting the average 1996 loads. Therefore, measurements will only be allowed for two BMPs, the watershed-scale sediment basin and constructed wetlands.

Watershed-scale BMPs, such as the sediment basin and constructed wetlands, where they are not easily calculated, will only be measured to generate credits. The schedule for measurements will be set within the buyer-seller contracts for specific watershed-scale BMPs.

Table 3. BMP Evaluation Requirements

BMP	**Evaluation**
Sediment basin - field scale	before & middle of all irrigations
Sediment basin - farm scale	before & middle of all irrigations
Sediment basin - watershed scale	before & middle of season of use
Filter strips	before & middle of all irrigations
Underground outlet	before & middle of all irrigations
Straw in furrows	before & middle of all irrigations
Crop sequencing	before & middle of all irrigations
Polyacrylamide	evaluate 2 irrigations & review application records
Sprinkler Irrigation	evaluate 1 irrigation
Microirrigation	evaluate 1 irrigation

Trailwater Recovery	before irrigations & evaluate 1 irrigation
Surge Irrigation	evaluate 1 irrigation
Nutrient Management	evaluate records annually
Constructed wetland	before & middle of season of use

Credit Production Method

To calculate a total phosphorus credit, a reduction estimate is determined prior to the sale of the credits, utilizing BMP effectiveness data and other applicable factors.

In the case of calculated credits, specifically to a cropland field, the phosphorus losses in 1996 (TMDL baseline) must be estimated. The Surface Irrigation Soil Loss (SISL) tool is currently the most accurate and simple method available for the program area to estimate soil losses from surface irrigated croplands. SISL losses are then converted to phosphorus losses by multiplying tons soil loss by 2, which provides pounds of phosphorus. Typically, there is on average two pounds of phosphorus loss per ton of soil loss within the program area. This tool is described in USDA-NRCS Agronomy Technical Note No. 32.

There is a great amount of variability in soil and phosphorus loss from one year to the next because of crop rotations, as the SISL shows when used according to its design. This variability would cause a great deal of fluctuation from year-to-year in credits generated from one field. This fluctuation is not desired for trading. Also, because there does not exist data for all fields within the program area for 1996, the crop specific SISL estimate cannot be derived for a number of fields.

An average subwatershed Base Soil Loss (BSL), a necessary factor in SISL, has been determined for each of the major Lower Boise River subwatersheds (Table 4). Numerous field crop records from 1996 were evaluated to establish baseline 1996 soil losses with SISL. By utilizing the average subwatershed BSL, crop rotations will have no effect on credit calculation because the pretreatment load of 1996 will not change. A change in credits will only be due to switching from one BMP to another.

Where the SISL-BSL represents seasonal sediment losses, monthly losses may be estimated utilizing numerous irrigation records, which can be used to provide an average number of irrigations per month. Another critical factor to be considered in determining an average sediment and phosphorus loss on a monthly basis, is the percent soil loss of total per irrigation. The first three irrigations typically produce the majority of the annual sediment loss, whereas, with each additional irrigation, less erosion takes place due to increasing soil stability and some crop foliage protection where it lies within the furrow later in the growing season.

Table 4. SISL BSL (tons/ac/yr soil loss[1]) per Subwatershed

Slope of field	<1%		1-1.9%		2-2.9%		>3%	
Drain/Field length	660	1320	660	1320	660	1320	660	1320
Eagle Drain	2.0	1.6	7.3	5.8	15.5	12.4	25.2	20.2
Thurman Drain[2]	NA	NA	NA	NA	NA	NA	NA	NA
Fifteenmile	1.6	1.3	5.8	4.6	12.5	10.0	21.0	16.8
Mill Slough	2.0	1.6	7.3	5.8	15.5	12.4	25.2	20.2
Willow Creek	1.9	1.5	6.8	5.5	14.7	11.7	24.0	19.2
Mason Slough	2.0	1.6	7.3	5.8	15.5	12.4	25.2	20.2
Mason Creek	1.7	1.4	6.4	5.1	14.1	11.2	23.7	18.9
East Hartley	2.0	1.6	7.3	5.8	15.7	12.5	25.6	20.5
West Hartley	2.0	1.6	7.3	5.8	15.7	12.5	25.6	20.5
Indian Creek	1.9	1.5	6.9	5.5	14.9	11.9	24.7	19.8
Conway Gulch	2.0	1.6	7.3	5.8	15.7	12.5	25.6	20.5
Dixie Drain	1.7	1.4	6.4	5.1	13.9	11.1	23.0	18.4
Boise River	2.0	1.6	7.3	5.8	15.5	12.4	25.2	20.2

[1] Multiple BSL by 2 to obtain pounds of phosphorus
[2] Thurman drain currently does not have any cropland fields within it drainage area.

Based on numerous irrigation records and local input, average number of irrigations per crop type per month was established, then one average for all crops per month. The average number of irrigations per month is shown in Table 5.

Table 5. Average Number of Irrigations per month, based on a 181-day irrigation season.

Month	Irrigations	Days/month
April	0.4	15
May	1.2	31
June	2.4	30
July	3.0	31
August	1.9	30
September	0.5	31
October	0.2	15
Total	9.5	181

The average number of irrigations per month was not rounded to the whole number because it would exclude any irrigation that does occur in April and October. The irrigation season is assumed to start on start on April 15 and end October 15, providing a 181 irrigation day season.

Based on numerous runoff studies on surface irrigated cropland, percent soil loss per irrigation was determined. These percent losses per irrigation were then lined up with the average 9-10 irrigations per season to estimate average percent loss per irrigation (Figure 1).

Figure 1. Average Percent Soil Loss per Irrigation per Total Season Loss

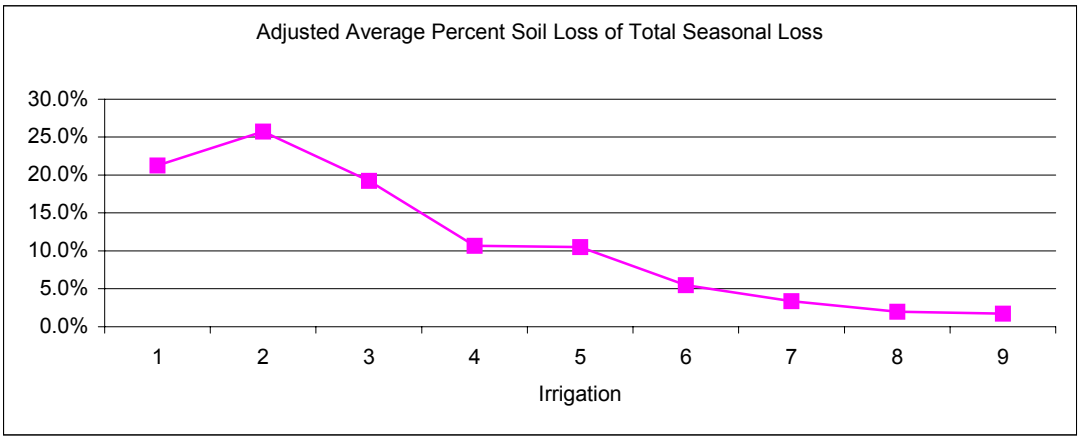

Table 6 shows the percent loss per month, which was derived from the average irrigations per month (Table 5) and percent loss per the 9-10 irrigations per season (Figure 1).

Table 6. Percent Soil Loss per Month

Month	**Percent Loss**
April	8.5%
May	28.1%
June	39.9%
July	19.4%
August	3.6%
September	0.4%
October	0.1%

Recent water quality samples taken throughout the Lower Boise River tributaries reflect similar loss characteristics, where the months of May, June, and July show the largest in-stream sediment loads. Once the seasonal SISL losses are determined, which represents the pretreatment load, a monthly estimate can be estimated with the values from Table 6.

Appendix

Carter, D.L. 2002. Proposed Best Management Practice (BMP) List and Application Criteria for the Lower Boise River. Unpublished report.